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[0030] [Example 3]

This example relates to a technology for simultaneously producing a TFT for a peripheral driver circuit and a TFT for a switching element to be provided for a pixel in an active matrix type liquid crystal display apparatus. As has been know, for an active matrix type liquid crystal display apparatus, a structure in which a TFT for switching to be provided for each pixel and a TFT to be provided on a peripheral driver circuit portion are formed on the same substrate (in particular, a glass substrate) is well known. A system configuration in the structure is schematically shown in Fig. 3(A).

[0031]

In the configuration as shown in Fig. 3, required characteristics differ between a TFT which is needed on the pixel portion and a TFT which is needed on the peripheral driver circuit portion. As the characteristics of the TFT needed on the pixel portion, a characteristic that off-state currents are small is required to enhance charge retention in a pixel, whereas high mobility and a capability of passing a large on-state currents are not required. On the other hand, for the TFT needed on the peripheral driver circuit portion, high mobility and a capability of passing a large on-state current are required.

[0032]

The shape of a TFT naturally differs between the pixel portion and the peripheral driver circuit portion. The TFT to

be provided on the pixel portion has a channel length of from 5 to 20 μm, for example, the channel length of the order of 10 μm and a channel width of the order ot 10 μm. On the other hand, for the TFT to be provided on the peripheral driver circuit portion, the channel length is of the order of 10 μm equal to the TFT for the pixel portion, whereas the channel width is within a range of from 50 to 200 μm, for example, the channel width of the order of 150 μm. Accordingly, the TFT for the peripheral driver circuit portion has an extremely wide channel width because it is necessary for the TFT on the peripheral driver circuit portion to pass a larger amount of currents, as compared to the TFT on the pixel portion intended for the charge retention in the pixel.

[0033]

Fig. 3(B) shows a top view of a TFT to be provided on the peripheral driver circuit portion. In Fig. 3(B), reference numeral 36 represents a gate electrode whose width is generally 10 μm (which means that the channel length is approximately 10 μm). Reference numerals 31, 33 represent source/drain regions, and reference numerals 34, 35 represent sour/drain contacts (on which source/drain electrodes are formed). Further, reference numeral 32 represents a channel forming region provided below the gate electrode 36.

[0036]

A production process of this example is schematically shown in Fig. 4. In Fig. 4, the left-hand part shows a conventional TFT to be provided on the pixel portion and the right-hand part shows a TFT for the peripheral driver circuit. A silicon oxide

film 42 is formed in thickness of 1000 Å as a base film on a glass substrate 41 through a spatter method. Next, an amorphous silicon film (constituting the parts represented by reference numerals 43-48) is formed by a plasma CVD method and crystallized by annealing at 600 degrees for 48 hours. Then, device isolation is carried out to form an active layer on each element region. More specifically, active layers of the TFT for the pixel represented by reference numerals 43-45 and active layers for the TFT for the peripheral driver circuit represented by reference numerals 46-48 are formed.

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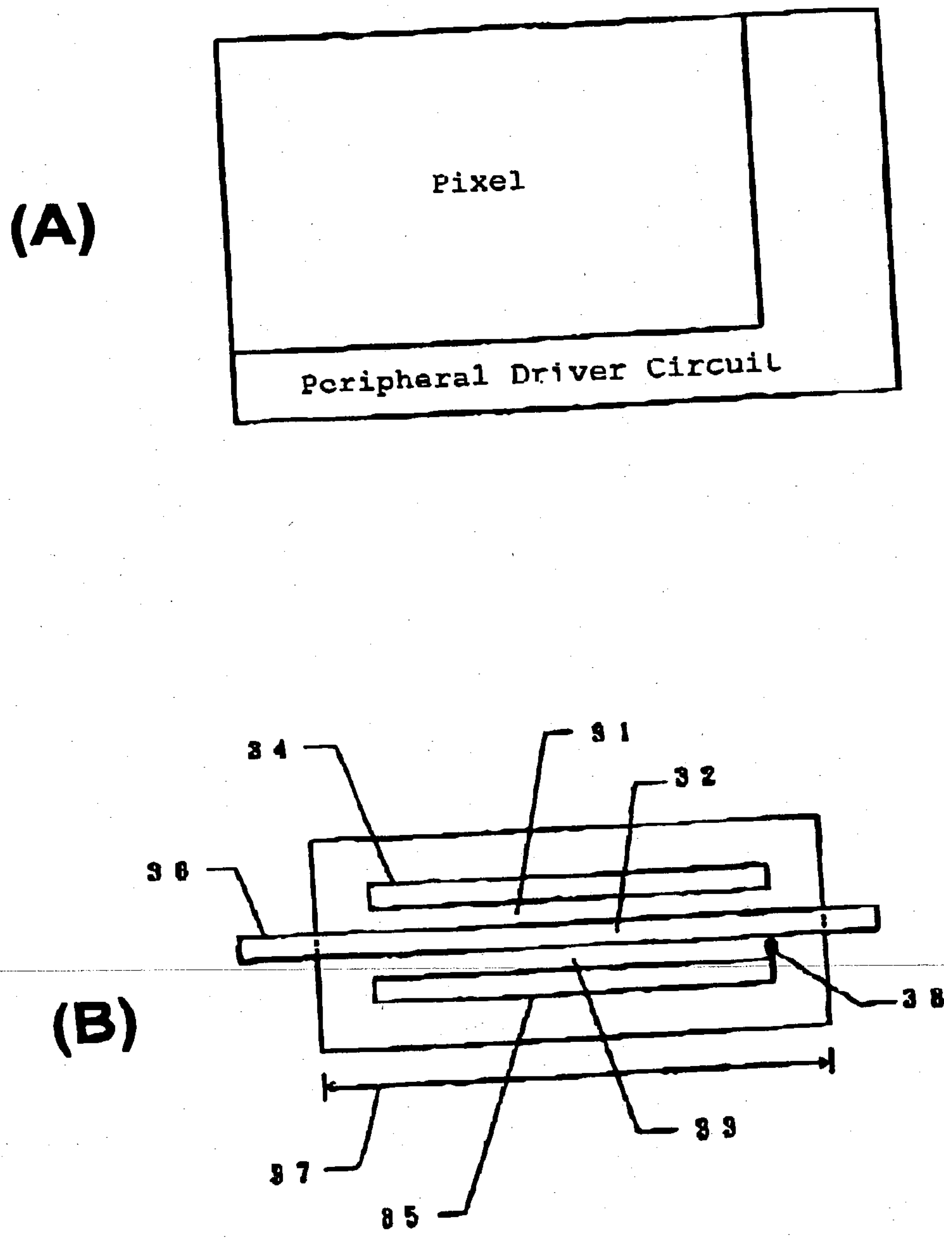

Fig. 3